UCRL-JC-124064 Abs

Properties of LMC Planetary Nebulae and Parent Populations in the MACHO Database

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The Macho Collaboration's long-term, wide-field, dedicated photometry database contains blue and red lightcurves for nearly 9 million stars distributed across 10 square degrees of the LMC bar. We have identified known PN (from the SMP and Jacoby catalogs) in the database and report on their variability over a 3 year period. Preliminary results suggest that a significant fraction exhibit low level “flickering” and, in some cases, obvious semi-regular amplitude variations. For a sample believed to be unresolved, we discuss the fraction of variable PN and correlations with PN properties, such as excitation class. We will present lightcurves and the results of a systematic search for periodicity among the variable PN.

In order to characterize PN in the LMC, we are studying the parent populations found in the Macho database. In particular, we are attempting to model the number of AGB stars in the LMC bar as a function of initial mass using recent stellar evolution tracks (incorporating mass loss on the RGB and AGB) and the best fitting parameterizations of the IMF and SFR. This AGB “initial mass distribution” is constrained by the total number of clump giants, the Cepheid pulsation mass distribution, and the AGB-LPV population. In this manner, we make a refined comparison among the variety of PN progenitor stars and investigate the AGB to PN evolutionary connection.

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under contract No. W-7405-Eng-48.